

CREATION OF AGRICULTURAL ELECTRONIC MAPS USING GEOINNOVATION METHODS AND TECHNOLOGIES

¹Khakimova Kamola Rakhimjonovna, ²Yokubov Sherzodbek Shavkat o'g'li

¹Associate Professor of Fergana Polytechnic Institute

²Fergana Polytechnic Institute

<https://doi.org/10.5281/zenodo.7541637>

Abstract. *In this article, based on the technological system of agricultural mapping by remote sensing of the Earth, the electronic, interactive, web maps of agriculture using the proposed technological systems, using the mapping of agricultural fields, geoinformation system and technologies, and programming platforms information about priority areas of proposals and recommendations for improvement of creation methods is given.*

Keywords: *GIS, maps, storage, analysis, processing, evaluation, creation, JavaFX, Arcgis, Fergana_AGRO.*

INTRODUCTION

Relevance and necessity of research

Creating and visualizing the social and economic processes taking place in the world and its various regions on the basis of modern GIS (geoinformation systems and technologies) is of great importance. Also, one of the important scientific and practical issues is conducting research on the use of cartographic support methods in the study and analysis of the agricultural sector. In this regard, including in the study of agricultural, natural and socio-economic problems related to the development of the economy in the USA, Russia, Ukraine, Germany, China, Vietnam and other developed countries of the world, using agricultural electronic cards. special attention is paid to providing reliable information about current cartography as an actual scientific-practical issue [1-3].

To develop efficient methods of data visualization and creation of electronic maps on the basis of data collection, storage, analysis, processing, evaluation and creation of a geodatabase using modern geoinformation systems and technologies for mapping agricultural networks in world cartography. great attention is being paid to conducting targeted scientific research. In this regard, one of the important tasks is the development of modern technologies of the geoinformation system and cartographic provisioning methods, including the improvement of the method of creating electronic maps describing the agricultural sector, taking into account the socio-economic conditions.

At present, comprehensive measures are being implemented in our republic to develop the economy and, in particular, agriculture, rational use of natural and labor resources of our country, and taking into account the existing natural resources and socio-economic conditions, to improve the territorial structure of agricultural sectors. In the Strategy of Actions for further development of the Republic of Uzbekistan in 2017-2021, among other things, the task of "...continuing institutional and structural reforms on modernization and rapid development of agriculture, reducing state participation in the economy" is set. In the implementation of these tasks, one of the important tasks is to carry out scientific research on the cartographic provision of the agricultural production potential of the regions and infrastructure facilities and to improve the method of creating thematic electronic maps based on geoinformation systems and technologies (GIS) [4-6].

Decree No. PF-5853 of the President of the Republic of Uzbekistan dated October 23, 2019 "On approval of the strategy of agricultural development of the Republic of Uzbekistan for 2020-2030" and "Uzbekistan" dated May 31, 2017 Resolution PQ-3024 "On measures to further improve the activities of the State Committee for Land Resources, Geodesy, Cartography and State Cadastre of the Republic" and other regulatory legal documents related to the development of the field of geodesy and cartography. this dissertation research serves as a basis for the improvement.

Level of study of the problem

The analysis of the existing scientific literature related to the field shows that, along with foreign scientists, scientific researches were conducted in our republic as well as foreign scientists on cartographic research and provision of problems related to the location and development of agriculture as the main branch of the economy. Therefore, the theoretical and methodological foundations of agricultural mapping were developed by foreign and Commonwealth of Independent States scientists - N.N. Baransky, A.P. Zolovsky, M.N. Nikishov, I.Yu. Levisky, V.I. Sukhov, A.D. Shuleykin, T.M. Yegorova, M. Nellis, Dj. Studied by Desiree, M.D. Steven, A.P. Vervevko, Ye.M. Krokmal, A.A. Reminsky, A.I. Preobrazhensky, Yu.S. Bilich, A.S. Vasmut, V.P. Shosky, T.I. Kozachenko, M.K. Muchilolar.

Research related to agricultural cartography in Uzbekistan is detailed in the scientific works of T.M. Mirzaliyev, E.Yu. Safarov, A. Egamberdiyev, A. Bozorboyev, K. Gadoyev, I.M. Musayev and other scientists [1-3]. The theoretical and methodological foundations of agricultural mapping based on GIS were studied by foreign scientists A.M. Berlyant, A.R. Batuyev, A.P. Karpik, V.S. Tikunov, D.V. Lisisky, D.V. Diem, N. Stupen, and in Uzbekistan E. Safarov, S.A. Avezov and others. reflected in his research.

Research on the creation of agricultural maps using remote sensing of the earth (ReMZ) data in foreign countries and the Commonwealth of Independent States: Yu.F. Knijnikov, V.I. Kravsov, T.V. Vereshchaka, Ye.L. Krinova, L.A. Plastinina, Ye. N. Sutyryna, V. P. Savinykh, V. S. Tikunov, A. M. Chandra, S. K. Gosh; It was carried out in Uzbekistan by E. Yu. Safarov, I. Musayev, S. A. Avezov and other scientists. Without denying the results of this research, the analysis of the results of scientific and practical research in the cartographic research of agriculture in Uzbekistan shows that nowadays, depending on the natural and socio-economic conditions, agricultural infrastructure objects and Research on improving the method of creating an electronic card of agriculture, which covers branches, cannot be said to be sufficient. In addition, it is important to create an electronic agricultural map and create interactive and web agricultural maps based on computer programming capabilities and agro-geodatabase.

Today, on the basis of the above, improving the method of creating an electronic map of agriculture based on the data of GIS, YeMZ is one of the urgent tasks of socio-economic cartography. In the implementation of these tasks, it is necessary to create an agro-geodatabase related to the socio-economic conditions of agricultural development, its networks and infrastructure facilities, and to develop the theoretical and methodological basis for the creation of modern agro-maps.

Agricultural sectors and infrastructures of Fergana region were taken as the object of the research.

The subject of research is the development of electronic, interactive and web maps covering agricultural networks and infrastructure objects and evaluating them qualitatively and

quantitatively, based on modern geographic information systems, YeMZ data and programming platforms [7-10].

METHODS

During the research, field work, topogeodetic search, cartographic, remote sensing of the earth, statistical, geoinformation system and technologies GlobalMapper, Surfer, ArcGIS programs and Java programming platforms, geovisualization research methods were used.

THE RESULTS

the method of creating electronic cards of agriculture has been improved, taking into account the classification and content elements of GIS and agricultural cards;

The method of mapping agricultural arable land in the ArcGIS program has been improved based on the technological system of agricultural mapping through YeMZ;

With the help of GIS technology programs, a technological system for creating and integrating an agro-geodatabase has been developed, and the method of visualizing agricultural data has been improved;

"Fergana_AGRO" agricultural interactive and technological systems for creating web maps are based on JavaFX and Arcgis online platforms [11-15].

DISCUSSION

The agro-geodata base of agriculture and complex electronic maps of agriculture play an important role in the fulfillment of the tasks of ensuring the inclusion of agricultural maps in the online geoportal and its integration into the National Geoinformation System.

The creation of an agrogeodatabase based on the method of creating agricultural electronic maps developed within the framework of the research includes the following stages: field research, creation and identification of thematic layers, integration of data into the geodatabase, agrogeodatabase conversion as a basis for creating interactive and web maps of agriculture.

A technological system for creating and converting an agro-geodatabase was developed by implementing the tasks mentioned in the above steps. In the process of creating an agrogeodatabase, an agrogeodatabase and thematic layers were created based on the information determined about the geographical location of agricultural networks, land areas, infrastructure objects and other features using a GPS device. As a result of the identification and classification of the thematic layers, an identification number was entered for all agricultural objects on the electronic card. In addition, in order to develop the geodetic and mathematical basis of agricultural electronic maps, vectorization of orthophoto planes of the researched area, geospatial connection and selection of conditional symbols are carried out [16-22].

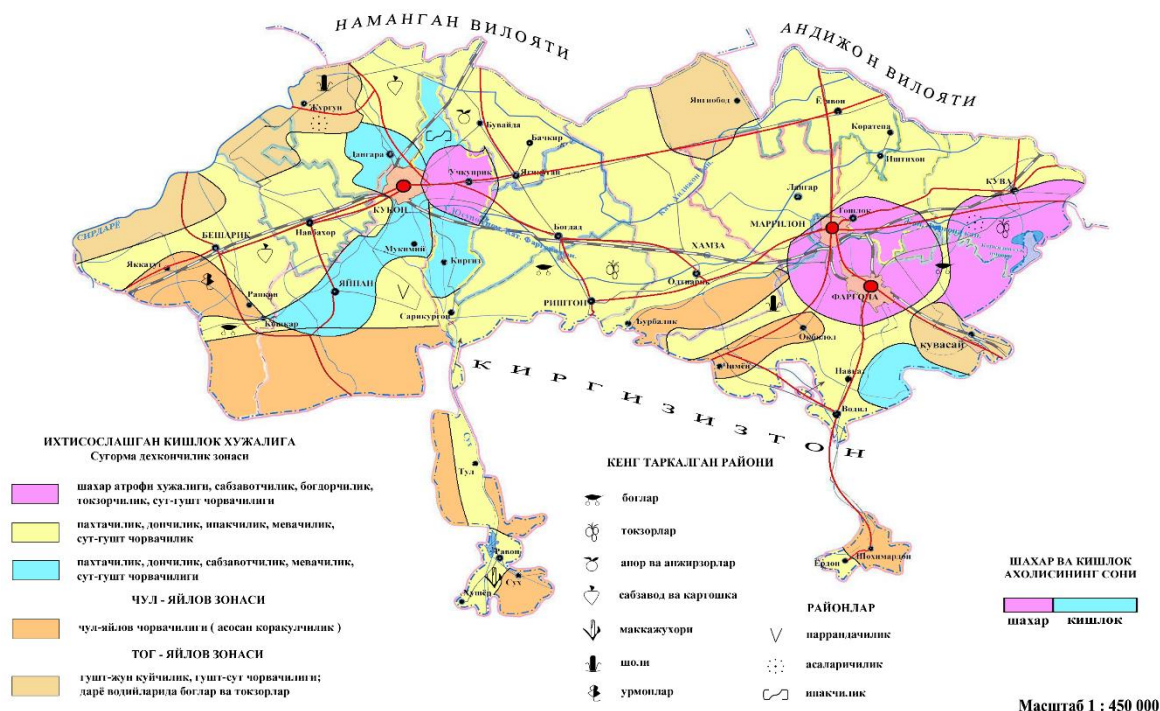
As a result of the research, it is possible to create an interactive and web map of agriculture through the development and conversion of attributive data of thematic layers and agrogeodatabase.

Thematic maps of agriculture were created based on the developed method of creating agricultural electronic cards and the technological system of creating and converting agro-geodatabase. Cartographic representation methods such as cartograms, cartodiagrams, points and symbols were used to describe the quality and quantity indicators of agriculture on the cards (Pictures 1, 2)..

Picture 1.

Fragment of an agricultural card of Fergana region

FERGANA AGRICULTURE MAP



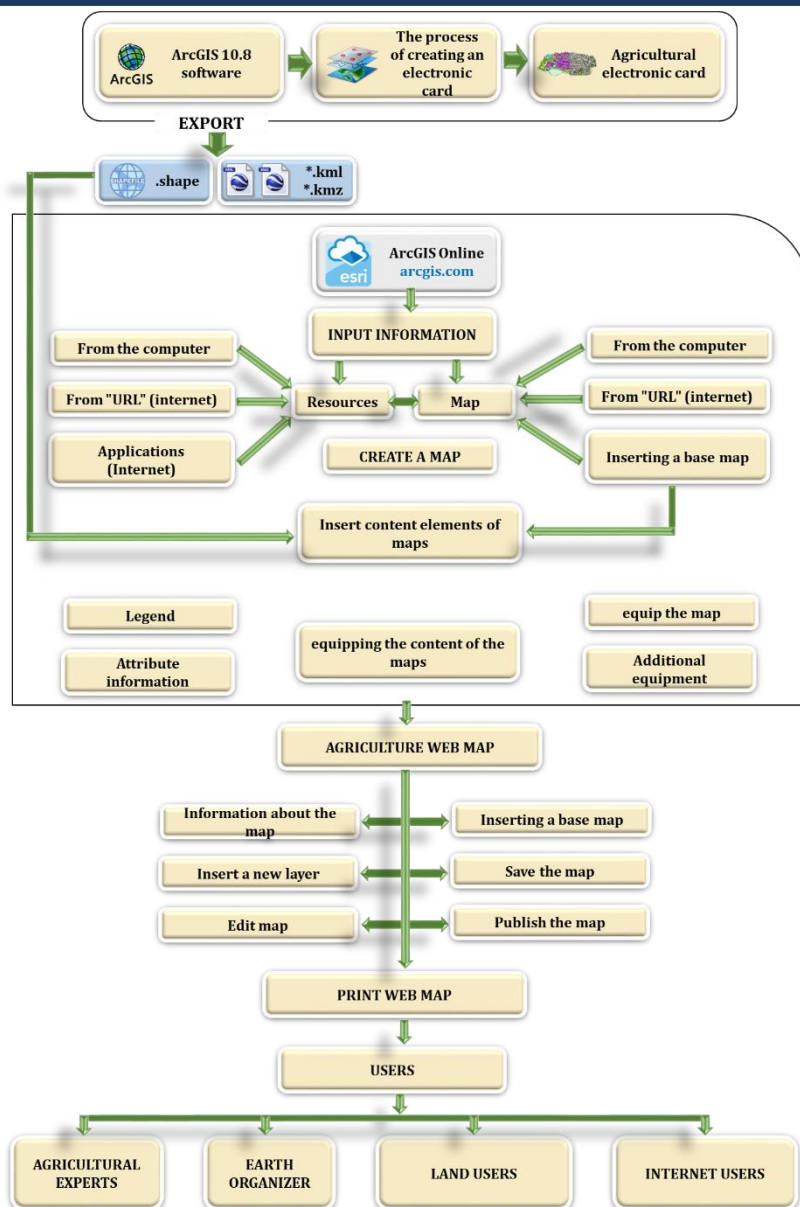
As a result of the conversion of the agrogeodatabase, it became possible to create interactive maps of agriculture. Based on the capabilities of the "JavaFX" platform and research on creating interactive maps, the technology for creating interactive agricultural maps of "Fergana_AGRO" and "Agro_LAND" was developed.

The effective aspects of the created interactive agricultural maps are as follows: improvement of the legend of the map due to the possibility of visualization; mutual integration with other electronic cards and web cards in the Internet system; an opportunity to work on modern computer devices was created [1-5].

During the research, a technological system for creating and converting an agrogeodatabase and a technological system for creating an agricultural web map was developed, analyzing the capabilities of the ArcGIS Online platform, and an agricultural web map was created (Pic. 2).

Picture 2.

A technological system for creating an agricultural web map



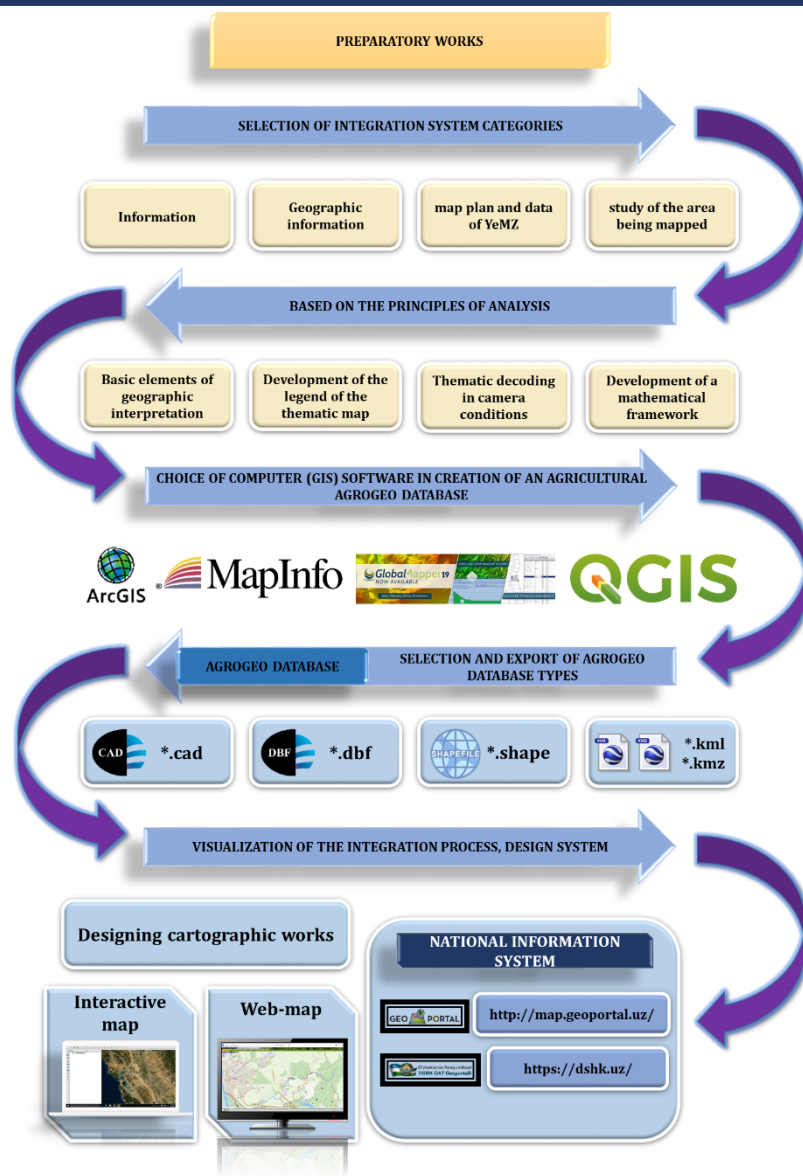
Based on this technological system, the agro-geodatabase of agriculture, created in ArcGIS 10.8 software, was created using the possibility of export via kml, shape, gpx, csv, txt type files, and an agricultural web map of the Republic of Uzbekistan was created.

In the course of the research, it was determined that there is a possibility of creating web cards on socio-economic topics based on the technological system of creating a web card. The ArcGIS Online platform was used to create the map and place it on the Internet [6-7].

Agricultural web maps provide the ability to remotely plan agricultural activities and projects in the regions, as well as to quickly receive or transfer information.

Picture 3.

Technological system of agrogeodatabase integration



The technological system of archeodatabase integration developed in order to solve the issues set before the research work (Pic. 3) serves the practical implementation of the tasks of ensuring the inclusion of agricultural maps in the online geoportal and its integration into the National Geoinformation System [8-10].

CONCLUSION

In conclusion, it should be said that the method of creating an agricultural agrogeodatabase and thematic layers was developed based on this technological system and achieves the following effective results:

- systematization of geodetic and cartographic work carried out in relevant organizations on agriculture;
- to maintain agricultural objects with unique identification numbers;
- to create and form electronic digital cards based on a single standard;
- to maintain the thematic layers related to agriculture according to a single standard on the republican scale;
- to provide rapid interactive service to our government on agriculture.

REFERENCES

1. Р.К.Ойматов, Геоахборот тизим ва технологиялари асосида қишлоқ хўжалигининг электрон карталарини тузиш услубини такомиллаштириш (Бухоро вилояти мисолида), - Тошкент – 2021
2. Arabboevna A. M., Shavkat o'g'li Y. S. The Use of Geoinformation Systems in the Study of the Land Fund of Household and Dekhkan Farms //Texas Journal of Multidisciplinary Studies. – 2022. – Т. 8. – С. 163-164.
3. Alakhanov Z. M. et al. THE STATE CADASTRE FOR THE REGULATION OF INFORMATION RESOURCES FOR THE FORMATION AND IMPROVEMENT //Educational Research in Universal Sciences. – 2022. – Т. 1. – №. 1. – С. 47-53.
4. Khakimova K. R. et al. SOME TECHNOLOGICAL ISSUES OF USING GIS IN MAPPING OF IRRIGATED LANDS //Galaxy International Interdisciplinary Research Journal. – 2022. – Т. 10. – №. 4. – С. 226-233.
5. Berdaliyeva Y. X. et al. Gis Dasturlari Yordamida Geografik Asos Qatlamlarini Joylashtirish Va Ularni Boshqarish //International Conferences On Learning And Teaching. – 2022. – Т. 1. – №. 6. – С. 312-314.
6. Abduraxmonov A. A. et al. DAVLAT YER KADASTRIDA GIS TEXNALOGIYALARIDAN FOYDALANISH //INTERNATIONAL CONFERENCES ON LEARNING AND TEACHING. – 2022. – Т. 1. – №. 8. – С. 228-233.
7. Mavlyankulova S. Z. et al. THE ESSENCE OF CARTOGRAPHIC MAPS IS THAT THEY ARE USED FOR CARTOGRAPHIC DESCRIPTION OF THE TERRAIN. GENERALIZING WORKS IN THE PREPARATION OF MAPS //RESEARCH AND EDUCATION. – 2022. – Т. 1. – №. 4. – С. 27-33.
8. Sherzodbek Y., Sitara M. THE ESSENCE OF CARTOGRAPHIC MAPS IS THAT THEY ARE USED FOR CARTOGRAPHIC DESCRIPTION OF THE TERRAIN //GENERALIZING WORKS IN THE PREPARATION OF MAPS.–2022.–2022.–2022. – 2022.
9. Ахмедов Б. М., ўғли Ёкубов Ш. Ш. КАДАСТР СЁМКАСИНИ БАЖАРИШ УЧУН ТОПОГРАФИК АСОСЛАР //INTERNATIONAL CONFERENCES ON LEARNING AND TEACHING. – 2022. – Т. 1. – №. 8. – С. 287-291.
10. Абдукадилова М. А., ўғли Ёкубов Ш. Ш. ЭЛЕКТРОН РАҚАМЛИ ХАРИТАЛАРДАГИ КОНТУРЛАР ЧЕГАРАСИ УЛАРНИ МАЙДОН (ПОЛИГОН) КЎРИНИШДА ЧИЗИШНИНГ ARCGIS ДАСТУРИЙ ТАЪМИНОТИ ОРҚАЛИ АВТОМАТЛАШГАН УСУЛИНИ ТАКОМИЛЛАШТИРИШ //INTERNATIONAL CONFERENCES ON LEARNING AND TEACHING. – 2022. – Т. 1. – №. 8. – С. 133-136.
11. Mamatqulov O., Qobilov S., Yokubov S. FARG 'ONA VILOYATINING TUPROQ QOPLAMIDA DORIVOR ZAFARON O 'SIMLIGINI YETISHTRISH //Science and innovation. – 2022. – Т. 1. – №. D7. – С. 240-244.
12. Mavlyankulova S. Z. THE ESSENCE AND FUNCTIONS OF CREATING A CARD, CHOOSING A METHOD FOR CREATING A CARD //INTERNATIONAL CONFERENCES ON LEARNING AND TEACHING. – 2022. – Т. 1. – №. 11. – С. 3-8.
13. O'G'Li S. Y. S., Zuxriddinovna M. S., Qizi A. S. B. THE USE OF MAPINFO PROGRAM METHODS IN THE CREATION OF CADASTRAL CARDS //Science and innovation. – 2022. – Т. 1. – №. A3. – С. 278-283.

14. qizi Olimova D. S. et al. THEORETICAL BASIS FOR THE USE OF MODERN GIS TECHNOLOGIES IN THE CREATION OF NATURAL CARDS //RESEARCH AND EDUCATION. – 2022. – T. 1. – №. 4. – C. 4-10.
15. qizi Olimova D. S. et al. THE ESSENCE AND FUNCTIONS OF CREATING A CARD, CHOOSING A METHOD FOR CREATING A CARD //INTERNATIONAL CONFERENCES. – 2022. – T. 1. – №. 11. – C. 137-143.
16. Mukhriddinkhonovich A. Z. Actual Issues of Design of Small Towns in Uzbekistan //Central Asian Journal of Theoretical and Applied Science. – 2022. – T. 3. – №. 6. – C. 576-580.
17. Arabboyevna A. M. Biological Activity of Typical Irrigated Gray Soils //Central Asian Journal of Theoretical and Applied Science. – 2022. – T. 3. – №. 6. – C. 285-289.
18. Raximjonovna X. K. et al. The Composition of the Lands Used in Agriculture and their Electronic Cartography //Central Asian Journal of Theoretical and Applied Science. – 2022. – T. 3. – №. 7. – C. 65-70.
19. Khakimova K. R. et al. MAP VISUALIZATION IN ARCGIS AND MAPINFO //Galaxy International Interdisciplinary Research Journal. – 2022. – T. 10. – №. 4. – C. 220-225.
20. Rakhimjonovna K. K., Abdulhay o'g'li A. A. Create a Layer of Maps Those are Part of the Livestock and Poultry Astral //Central Asian Journal of Theoretical and Applied Science. – 2022. – T. 3. – №. 11. – C. 61-67.
21. Rakhimjonovna K. K., Mukhddin M. K. TYPES OF GEODETIC WORKS IN THE CONSTRUCTION OF HIGH-RISE BUILDINGS AND STRUCTURES //British Journal of Global Ecology and Sustainable Development. – 2022. – T. 10. – C. 98-103.
22. Мадумаров Б. Б., Манопов Х. В. НАЧАЛО РАБОТЫ С ARCGIS. ARCMAP //Central Asian Journal of Theoretical and Applied Science. – 2022. – T. 3. – №. 6. – C. 325-333.